SEQUENCE LISTING

<110> Ottawa Health Research Institute Wellstat Biologics Corporation <120> Mutant Viruses and Uses Thereof <130> 16666 <150> 60/457,591 <151> 2003-03-27 <160> 20 <170> PatentIn version 3.3 <210> <211> 11161 <212> DNA <213> Vesicular stomatitis virus <400> 1 acgaagacaa acaaaccatt attatcatta aaaggctcag gagaaacttt aacagtaatc 60 aaaatgtctg ttacagtcaa gagaatcatt gacaacacag tcatagttcc aaaacttcct 120 gcaaatgagg atccagtgga atacccggca gattacttca gaaaatcaaa ggagattcct 180 ctttacatca atactacaaa aagtttgtca gatctaagag gatatgtcta ccaaggcctc 240 aaatccggaa atgtatcaat catacatgtc aacagctact tgtatggagc attgaaggac 300 atccggggta agttggataa agattggtca agtttcggaa taaacatcgg gaaggcaggg 360 gatacaatcg gaatatttga ccttgtatcc ttgaaagccc tggacggtgt acttccagat 420 ggagtatcgg atgcttccag aaccagcgca gatgacaaat ggttgccttt gtatctactt ·480 ggcttataca gagtgggcag aacacaaatg cctgaataca gaaaaaggct catggatggg 540 ctgacaaatc aatgcaaaat gatcaatgaa cagtttgaac ctcttgtgcc agaaggtcgt 600 gacatttttg atgtgtgggg aaatgacagt aattacacaa aaattgtcgc tgcagtggac 660 atgttcttcc acatgttcaa aaaacatgaa tgtgcctcgt tcagatacgg aactattgtt 720 tccagattca aagattgtgc tgcattggca acatttggac acctctgcaa aataaccgga 780 atgtctacag aagatgtaac gacctggatc ttgaaccgag aagttgcaga tgagatggtc 840 caaatgatgc ttccaggcca agaaattgac aaggccgatt catacatgcc ttatttgatc . 900 gactttggat tgtcttctaa gtctccatat tcttccgtca aaaaccctgc cttccacttc 960 tgggggcaat tgacagctct tctgctcaga tctaccagag caaggaatgc ccgacagcct 1020 gatgacattg agtatacatc tettactaca geaggtttgt tgtaegetta tgeagtagga 1080 tectetgetg aettggeaca acagttttgt gttggagata geaaataeae tecagatgat 1140 agtaccggag gattgacgac taatgcaccg ccacaaggca gagatgtggt cgaatggctc 1200 ggatggtttg aagatcaaaa cagaaaaccg actcctgata tgatgcagta tgcgaaacga 1260

gcagtcatgt	cactgcaagg	cctaagagag	aagacaattg	gcaagtatgc	taagtcagaa	1320
tttgacaaat	gaccctataa	ttctcagatc	acctattata	tattatgcta	catatgaaaa	1380
aaactaacag	atatcatgga	taatctcaca	aaagttcgtg	agtatctcaa	gtcctattct	1440
cgtctagatc	aggcggtagg	agagatagat	gagatcgaag	cacaacgagc	tgaaaagtcc	1500
aattatgagt	tgttccaaga	ggacggagtg	gaagagcata	ctaggccctc	ttattttcag	1560
gcagcagatg	attctgacac	agaatctgaa	ccagaaattg	aagacaatca	aggcttgtat	1620
gtaccagatc	cggaagctga	gcaagttgaa	ggctttatac	aggggccttt	agatgactat	1680
gcggatgagg	acgtggatgt	tgtattcact	tcggactgga	aacagcctga	gcttgaatcc	1740
gacgagcatg	gaaagacctt	acggttgaca	ttgccagagg	gtttaagtgg	agagcagaaa	1800
tcccagtggc	ttttgacgat	taaagcagtc	gttcaaagtg	ccaaacactg	gaatctggca	1860
gagtgcacat	ttgaagcatc	gggagaaggg	gtcatcataa	aaaagcgcca	gataactccg	1920
gatgtatata	aggtcactcc	agtgatgaac	acacatccgt	cccaatcaga	agccgtatca	1980
gatgtttggt	ctctctcaaa	gacatccatg	actttccaac	ccaagaaagc	aagtcttcag	2040
cctctcacca	tatccttgga	tgaattgttc	tcatctagag	gagaattcat	ctctgtcgga	2100
ggtaacggac	gaatgtctca	taaagaggcc	atcctgctcg	gtctgaggta	caaaaagttg	2160
tacaatcagg	cgagagtcaa	atattctctg	tagactatga	aaaaaagtaa	cagatatcac	2220
aatctaagtg	ttatcccaat	ccattcatca	tgagttcctt	aaagaagatt	ctcggtctga	2280
aggggaaagg	taagaaatct	aagaaattag	ggatcqcacc	acccccttat	gaagaggaca	2340
ctaacatgga	gtatgctccg	agcgctccaa	ttgacaaatc	ctattttgga	gttgacgaga	2400
gggacactca	tgatccgcat	caattaagat	atgagaaatt	cttctttaca	gtgaaaatga	2460
cggttagatc	taatcgtccg	ttcagaacat	actcagatgt	ggcagccgct	gtatcccatt	2520
gggatcacat	gtacatcgga	atggcaggga	aacgtccctt	ctacaagatc	ttggcttttt	2580
tgggttcttc	taatctaaag	gccactccag	cggtattggc	agatcaaggt	caaccagagt	2640
atcacgctca	ctgtgaaggc	agggcttatt	tgccacacag	aatggggaag	acccctccca	2700
tgctcaatgt	accagagcac	ttcagaagac	cattcaatat	aggtctttac	aagggaacgg	2760
ttgagctcac	aatgaccatc	tacgatgatg	agtcactgga	agcagctcct	atgatctggg	2820
atcatttcaa	ttcttccaaa	ttttctgatt	tcagagagaa	ggccttaatg	tttggcctga	2880
ttgtcgagaa	aaaggcatct	ggagcttggg	tcctggattc	tgtcagccac	ttcaaatgag	2940
ctagtctagc	ttccagcttc	tgaacaatcc	ccggtttact	cagtctctcc	taattccagc	3000
ctttcgaaca	actaatatcc	tgtctttct	atccctatga	aaaaaactaa	cagagatcga	3060
tctgtttcct	tgacaccatg	aagtgccttt	tgtacttagc	tttttattc	atcggggtga	3120
attgcaagtt	caccatagtt	tttccataca	accgaaaagg	aaactggaaa	aatgttcctt	3180

		•				
ccaattacca	ttattgcccg	g tcaagctcac	g atttaaattg	g gcataatgac	ttaataggca	3240
cagccttaca	agtcaaaatc	g cccaagagto	acaaggctat	tcaagcagac	ggttggatgt	3300
gtcatgctto	caaatgggto	actacttgtg	, atttccgctc	gtacggaccg	, aagtatataa	3360
cacattccat	ccgatccttc	actccatcte	r tagaacaatg	r caaggaaagc	attgaacaaa	3420
					tatgcaactg	3480
tgacggatgo	tgaagcagcg	attgtccagg	tgactcctca	ccatgtgctt	gttgatgaat	3540
acacaggaga	atgggttgat	tcacagttca	tcaacggaaa	. atgcagcaat	gacatatgcc	3600
ccactgtcca	taactccaca	acctggcatt	ccgactataa	ggtcaaaggg	ctatgtgatt	3660
ctaacctcat	ttccatggac	atcaccttct	tctcagagga	cggagagcta	tcatccctag	3720
	cacagggttc					3780
gcaaaatgca	gtactgcaag	cattggggag	tcagactccc	atcaggtgtc	tggttcgaga	3840
tggctgataa	ggatctcttt	gctgcagcca	gattccctga	atgcccagaa	gggtcaagta	3900
tetetgetee	atctcagacc	tcagtggatg	taagtctcat	tcaggacgtt	gagaggatct	3960
tggattattc	cctctgccaa	gaaacctgga	gcaaaatcag	agcgggtctt	cccatctctc	4020
cagtggatct	cagctatctt	gctcctaaaa	acccaggaac	cggtcctgtc	tttaccataa	4080
tcaatggtac	cctaaaatac	tttgagacca	gatacatcag	agtcgatatt	gctgctccaa	4140
tcctctcaag	aatggtcgga	atgatcagtg	gaactaccac	agaaagggaa	ctgtgggatg	4200
actgggctcc	atatgaagac	gtggaaattg	gacccaatgg	agttctgagg	accagttcag	4260
	tcctttatat					4320
gctcaaaggc	tcaggtgttt	gaacatcctc	acattcaaga	cgctgcttcg	cagetteetg	4380
atgatgagac	tttattttt	ggtgatactg	ggctatccaa	aaatccaatc	gagtttgtag	4440
	cagtagttgg					4500
	attcttggtt					4560
	acagatttat					4620
	agattcttca					4680
	tattttaatt					4740
	gagaccgacg					4800
	cccgatgagc					4860
	agtgatgata					4920
	gatagtaaga					4980
	tcaacatctc					5040
tcatgatgcc	agtcaagggt	atagttttt	acatgaagtg	gacaaagagg	cagaaataac	5100

•			•			
atttgacgtg	gtggagacct	tcatccgcgg	g ctggggcaac	: aaaccaattg	aatacatcaa	5160
					agtttttgga	5220
					tcaacttggc	5280
					gcaggcttag	5340
					agaaacttga	5400
tattctaatg	gaccgaaact	ttctgttaat	ggtcaaagat	gtgattatag	ggaggatgca	5460
aacggtgcta	tccatggtat	gtagaataga	caacctgttc	tcagagcaag	acatcttctc	5520
				aggcagggaa		5580
tgacttgatt	aaaatggtgg	aaccgatatg	caacttgagg	ctgatgaaat	tagcaagaga	5640
atcaaggcct	ttagtcccac	aattccctca	ttttgaaaat	catatcaaga	cttctgttga	5700
tgaaggggca	aaaattgacc	gaggtataag	attcctccat	gatcagataa	tgagtgtgaa	5760
aacagtggat	ctcacactgg	tgatttatgg	atcgttcaga	cattggggtc	atccttttat	5820
agattattac	gctggactag	aaaaattaca	ttcccaagta	accatgaaga	aagatattga	5880
tgtgtcatat	gcaaaagcac	ttgcaagtga	tttagctcgg	attgttctat	ttcaacagtt	5940
caatgatcat	aaaaagtggt	tcgtgaatgg	agacttgctc	cctcatgatc	atccctttaa	6000
aagtcatgtt	aaagaaaata	catggcccac	agctgctcaa	gttcaagatt	ttggagataa	6060
atggcatgaa	cttccgctga	ttaaatgttt	tgaaataccc	gacttactag	acccatcgat	6120
				gtgttgaaac		6180
				actatgttgg		6240
· ·				ggcttagatg		6300
aattattggt	cttaaaggaa	aggagaggga	actgaagttg	gcaggtagat	ttttctccct	6360
aatgtcttgg (6420
•		·		actgcagtca		6480
gttagattcc (6540
cattgattac g						6600
agttatgggc (6660
gaaaagtctt a						6720
gatcaattca a						6780
acggcaaaaa g						6840
aaacactgct c						6900
aacgaagaaa t						6960
taatgagaaa a	attatgactg	caatcaaaat	agggacaggg	aagttaggac	ttttgataaa	7020

tgacgatgag	actatgcaat	ctgcagatta	cttgaattat	ggaaaaatac	cgattttccg	7080
tggagtgatt	agagggttag	agaccaagag	s atggtcacga	gtgacttgtg	tcaccaatga	7140
ccaaataccc	acttgtgcta	atataatgag	ctcagtttcc	acaaatgctc	tcaccgtagc	7200
					ggacatttgc	7260
					aagttcaaga	7320
					tggacccttc	7380
					tcccagatcc	7440
					gtgagcatct	7500
			cgagatagcc			7560
					gtccagcgaa	7620
					tcaggaacca	7680
			tcatgaagag			7740
			tttaagtgaa			7800
			tcaaaattct			7860
			tttgattgtg			7920
			gggatcatgt			7980
			ctggggccgt			8040
			acatcgaaaa			8100
taacacatca						8160
tagttcacgg	ggaccattgc	ctgcttatct	agggtctaaa	acatctgaat	ctacatctat	8220
tttgcagcct						8280
agatgctatc	tcttggtttg	ttgaacccga	ctctaaacta	gcaatgacta	tactttctaa	8340
catccactct	ttaacaggcg	aagaatggac	caaaaggcag	catgggttca	aaagaacagg	8400
gtctgccctt	cataggtttt	cgacatctcg	gatgagccat	ggtgggttcg	catctcagag	8460
cactgcagca						8520
gaatttcgac						8580
aagagacgga						8640
gagacccata g						8700
ccatgtgctg a						8760
ctatccttta c						8820
cagatgtata ç						8880
cagttctcta t						8940

gttgctagac	ggattaatga	gagcaagttg	ctgccaagta	atacaccgga	gaagtctggc	9000
tcatttgaag	aggccggcca	acgcagtgta	cggaggtttg	atttacttga	ttgataaatt	9060
gagtgtatca	cctccattcc	tttctcttac	tagatcagga	cctattagag	acgaattaga	9120
		caacctccta				9180
					acagatcaca	9240
		tctcagatgt				9300
		aaatcctata				9360
		atctttcttc				9420
		ccaaggacat				9480
		aggataataa				9540
		caacaatccc			•	9600
		gaatccaaaa				9660
gttaccaact	ggcgctcatt	ataaaattcg	gagtatatta	catggaatgg	gaatccatta	9720
		gagacggctc				9780
		tattcaatag		•		9840
	•	ccagtgccct				9900
		gggaatatcc				9960
ctatttcctc	cgactcaaag	caggcttggg	gcttcaaatt	gatttaattg	taatggatat	10020
ggaagttcgg	gattcttcta	ctagcctgaa	aattgagacg	aatgttagaa	attatgtgca	10080
ccggattttg	gatgagcaag	gagttttaat	ctacaagact	tatggaacat	atatttgtga	10140
gagcgaaaag	aatgcagtaa	caatccttgg	tcccatgttc	aagacggtcg	acttagttca	10200
aacagaattt	agtagttctc	aaacgtctga	agtatatatg	gtatgtaaag	gtttgaagaa	10,260
		ccgattggtc				10320
		aggaatttgc		•		10380
cttgacaggt	attccctccc	aattcattcc	tgatcctttt	gtaaacattg	agactatgct	10440
acaaatattc	ggagtaccca	cgggtgtgtc	tcatgcggct	gccttaaaat	catctgatag	10500
acctgcagat	ttattgacca	ttagcctttt	ttatatggcg	attatatcgt	attataacat	10560
caatcatatc	agagtaggac	cgatacctcc	gaacccccca	tcagatggaa	ttgcacaaaa	10620
tgtggggatc	gctataactg	gtataagctt	ttggctgagt	ttgatggaga	aagacattcc	10680
actatatcaa	cagtgtttag	cagttatcca	gcaatcattc	ccgattaggt	gggaggctgt	10740
ttcagtaaaa	ggaggataca	agcagaagtg	gagtactaga	ggtgatgggc	teccaaaaga	10800
tacccgaatt	tcagactcct	tggccccaat	cgggaactgg	atcagatctc	tggaattggt	10860

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys 1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn 20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val 35 40 45

Asp Glu Arg Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe

300

360

	50		ī			55					60					
Phe 65	Phe	Thr	Val	Lys	Met 70	Thr	Val	Arg	Ser	Asn 75	Arg	Pro	Phe	Arg	Thr 80	
Tyr	Ser	Asp	Val	Ala 85	Ala	Ala	Val	Ser	His 90	Trp	Asp	His	Met	Tyr 95	Ile	
Gly	Met	Ala	Gly 100	Lys	Arg	Pro	Phe	Tyr 105	Lys	Ile	Leu	Ala	Phe 110	Leu	Gly	
Ser	Ser	Asn 115	Leu	ГÀв	Ala	Thr	Pro 120	Ala	Val	Leu	Ala	Asp 125	Gln	Gly	Gln	
Pro	Glu 130	Tyr	His	Ala	His	Cys 135	Glu	Gly	Arg	Ala	Tyr 140	Leu	Pro	His	Arg	
Met 145	Gly	Lys	Thr	Pro	Pro 150	Met	Leu	Asn	Val	Pro 155	Glu	His	Phe	Arg	Arg 160	
Pro	Phe	Asn	Ile	Gly 165	Leu	Tyr	Lys	Gly	Thr 170		Glu	Leu	Thr	Met 175	Thr	•
Ile	Tyr	Asp	Asp 180	Glu	Ser	Leu	Glu	Ala 185	Ala	Pro	Met	Ile	Trp 190	Asp	His	
Phe	Asn	Ser 195	Ser	Lys	Phe	Ser	Asp 200	Phe	Arg	Glu	Lys	Ala 205	Leu	Met	Phe	
Gly	Leu 210	Ile	Val	Glu	Lys	Lys 215	Ala	Ser	Gly	Ala	Trp 220	Val	Leu	Asp	Ser	-
Val 225	Ser	His	Phe	Lys												
<210 <211 <212 <213	.> 1 !> [.1161 NA		sto	omati	tis	viru	ıs								
	<400> 4 acgaagacaa acaaaccatt attatcatta aaaggctcag gagaaacttt aacagtaatc 60															
															taatc	120
															tteet	120 180
															gcctc	

aaatccggaa atgtatcaat catacatgtc aacagctact tgtatggagc attgaaggac

atccggggta agttggataa agattggtca agtttcggaa taaacatcgg gaaggcaggg

		•		•		
					acttccagat	420
					gtatctactt	480
					catggatggg	540
					agaaggtcgt	600
gacatttttg	atgtgtgggg	aaatgacagt	aattacacaa	aaattgtcgc	tgcagtggac	660
atgttcttcc	acatgttcaa	aaaacatgaa	tgtgcctcgt	tcagatacgg	aactattgtt	720
tccagattca	aagattgtgc	tgcattggca	acatttggac	acctctgcaa	aataaccgga	780
atgtctacag	aagatgtaac	gacctggatc	ttgaaccgag	aagttgcaga	tgagatggtc	840
caaatgatgc	ttccaggcca	agaaattgac	aaggccgatt	catacatgcc	ttatttgatc	900
gactttggat	tgtcttctaa	gtctccatat	tcttccgtca	aaaaccctgc	cttccacttc	9.60
tgggggcaat	tgacagctct	tctgctcaga	tccaccagag	caaggaatgc	ccgacagcct	1020
gatgacattg	agtatacatc	tcttactaca	gcaggtttgt	tgtacgctta	tgcagtagga	1080
				gcaaatacac		1140
				gagatgtggt		1200
ggatggtttg	aagatcaaaa	cagaaaaccg	actcctgata	tgatgcagta	tgcgaaacga	1260
gcagtcatgt	cactgcaagg	cctaagagag	aagacaattg	gcaagtatgc	taagtcagaa	1320
				tattatgcta		1380
aaactaacag	atatcatgga	taatctcaca	aaagttcgtg	agtatctcaa	gtcctattct	1440
cgtctagatc	aggcggtagg	agagatagat	gagatcgaag	cacaacgagc	tgaaaagtcc	1500
				ctaggccctc		1560
				aagacaatca		1620
gtaccagatc	cggaagctga	gcaagttgaa	ggctttatac	aggggccttt	agatgactat	1680
				aacagcctga		1740
gacgagcatg	gaaagacctt	acggttgaca	ttgccagagg	gtttaagtgg	agagcagaaa	1800
				ccaaacactg		1860
gagtgcacat	ttgaagcatc	gggagaaggg	gtcatcataa	aaaagcgcca	gataactccg	1920
				cccaatcgga		1980
				ccaagaaagc		2040
					ctctgtcgga ·	2100
ggtaacggac						2160
tacaatcagg						2220
aatctaagtg						2280
					-	

•						
aggggaaagg	taagaaatct	aagaaattag	ggatcgcacc	acccccttat	gaagaggaca	2340
ctaacatgga	gtatgctccg	agcgctccaa	ttgacaaatc	ctattttgga	gttgacgaga	2400
tggacactca	tgatccgcat	caattaagat	atgagaaatt	cttctttaca	gtgaaaatga	2460
cggttagatc	taatcgtccg	ttcagaacat	actcagatgt	ggcagccgct	gtatcccatt	2520
gggatcacat	gtacatcgga	atggcaggga	aacgtccctt	ctacaagatc	ttggcttttt	2580
tgggttcttc	taatctaaag	gccactccag	cggtattggc	agatcaaggt	caaccagagt	2640
atcacgctca	ctgtgaaggc	agggcttatt	tgccacacag	aatggggaag	acccctccca	2700
tgctcaatgt	accagagcac	ttcagaagac	cattcaatat	aggtctttac	aagggaacgg	2760
ttgagctcac	aatgaccatc	tacgatgatg	agtcactgga	agcagctcct	atgatctggg	2820
atcatttcaa	ttcttccaaa	ttttctgatt	tcagagagaa	ggccttaatg	tttggcctga	2880
ttgtcgagaa	aaaggcatct	ggagcttggt	tcctggattc	tgtcagacac	ttcaaatgag	2940
ctagtctagc	ttccagcttc	tgaacaatcc	ccggtttact	cagtctctcc	taattccagc	3000
ctttcgaaca	actaatatcc	tgtcttttct	atccctatga	aaaaaactaa	cagagatcga	3060
tctgtttcct	tgacaccatg	aagtgccttt	tgtacttagc	ttttttattc	atcggggtga	3120
attgcaagtt	caccatagtt	tttccataca	accaaaaagg	aaactggaaa	aatgttcctt	3180
ccaattacca	ttattgcccg	tcaagctcag	atttaaattg	gcataatgac	ttaataggca	3240
cagccttaca	agtcaaaatg	cccaagagtc	acaaggctat	tcaagcagac	ggttggatgt	3300
gtcatgcttc	caaatgggtc	actacttgtg	atttccgctg	gtacggaccg	aagtatataa	3360
cacattccat	ccgatccttc	actccatctg	tagaacaatg	caaggaaagc	attgaacaaa	3420
cgaaacaagg	aacttggctg	aatccaggct	tccctcctca	aagttgtgga	tatgcaactg	3480
tgacggatgc	tgaagcagcg	attgtccagg	tgactcctca	ccatgtgctt	gttgatgaat	3540
acacaggaga	atgggttgat	tcacagttca	tcaacggaaa	atgcagcaat	gacatatgcc	3600
ccactgtcca	taactccaca	acctggcatt	ccgactataa	ggtcaaaggg	ctatgtgatt	3660
ctaacctcat	ttccatggac	atcaccttct	tctcagagga	cggagagcta	tcatccctag	3720
gaaaggaggg	cacagggttc	agaagtaact	actttgctta	tgaaactgga	gacaaggcct	3780
gcaaaatgca	gtactgcaag	cgttggggag	tcagactccc	atcaggtgta	tggttcgaga	3840
tggctgataa	ggatctcttt	gctgcagcca	gattccctga	atgcccagaa	gggtcaagta	3900
tctctgctcc	atctcagacc	tcagtggatg	taagtctcat	tcaggacgtt	gagaggatct	3960
tggattattc	cctctgccaa	gaaacctgga	gcaaaatcag	agcgggtctt	cccatctctc	4020
cagtggatct	cagctatctt	gctcctaaaa	acccaggaac	cggtcctgtc	tttaccataa	4080
tcaatggtac	cctaaaatac	tttgagacca	gatacatcag	agtcgatatt	gctgctccaa	4140
tcctctcaag	aatggtcgga	atgatcagtg	gaactaccac	agaaagggaa	ctgtgggatg	4200

actgggctc	c atatgaaga	c gtggaaatt	g gacccaatg	g agttctgag	g accagttcag	4260
gatataagt	t tcctttata	t atgattgga	c atggtatgt	t ggactccgai	cttcatctta	4320
gctcaaagg	c tcaggtgtt	t gaacatcct	c acattcaaga	a cgctgctgcg	g cagcttcctg	4380
atgatgaga	c tttatttt	t ggtgatact	g ggctatcca	a aaatccaato	gagtttgtag	4440
					: atagggttaa	4500
tcattggac	t attcttggt	t ctccgagtt	g gtatttatct	ttgcattaaa	ttaaagcaca	4560
ccaagaaaa	g acagattta	t acagacata	g agatgaacco	g acttgggaag	taactcaaat	4620
					gctcaaagag	4680
gccttaatta	a tattttaat	t tttaatttt	atgaaaaaa	ctaacagcaa	tcatggaagt	4740
ccacgattti	t gagaccgac	g agttcaatga	a tttcaatgaa	gatgactatg	ccacaagaga	4800
attcctgaat	cccgatgage	gcatgacgta	cttgaatcat	gctgattaca	atttgaattc	4860
tcctctaatt	agtgatgata	ttgacaattt	gatcaggaaa	ttcaattctc	ttccgattcc	4920
			g agttcttgag			4980
caatcccatc	tcaacatctc	agatgcataa	atggatggga	agttggttaa	tgtctgataa	5040
tcatgatgco	agtcaagggt	atagttttt	acatgaagtg	gacaaagagg	cagaaataac	5100
atttgacgtg	gtggagacct	tcatccgcgg	ctggggcaac	aaaccaattg	aatacatcaa	5160
aaaggaaaga	tggactgact	cattcaaaat	tctcgcttat	ttgtgtcaaa	agtttttgga	5220
			tgtctctgag			5280
			ttctcatgga			5340
			agaaggatgg			5400
			ggtcaaagat			5460
			caacctgttc			5520
ccttctaaat	atctacagaa	ttggagataa	aattgtggag	aggcagggaa	atttttctta	5580
			caacttgaag			5640
			ttttgaaaat			5 7 00
tgaaggggca	aaaattgacc	gaggtataag	attcctccat	gatcagataa	tgagtgtgaa	5760
aacagtggat	ctcacactgg	tgatttatgg	atcgttcaga	cattggggtc	atccttttat	5820
			ttcccaagta			5880
tgtgtcatat	gcaaaagcac	ttgcaagtga	tttagctcgg	attgttctat	ttcaacagtt	5940
caatgatcat	aaaaagtggt	tcgtgaatgg	agacttgctc	cctcatgatc	atccctttaa	6000
aagtcatgtt	aaagaaaata	catggcccac	agctgctcaa	gttcaagatt	ttggagataa	6060
atggcatgaa	cttccgctga	ttaaatgttt	tgaaataccc	gacttactag	acccatcgat	6120

				taggtcagag			6180
						acacaaaggc	6240
				tgatgagaag			6300
				actgaagttg			6360
	aatgtcttgg	aaattgcgag	aatactttgt	aattaccgaa	tatttgataa	agactcattt	6420
	cgtccctatg	tttaaaggcc	tgacaatggc	ggacgatcta	actgcagtca	ttaaaaagat	6480
	gttagattcc	tcatccggcc	aaggattgaa	gtcatatgag	gcaatttgca	tagccaatca	6540
	cattgattac	gaaaaatgga	ataaccacca	aaggaagtta	tcaaacggcc	cagtgttccg	6600
	agttatgggc	cagttcttag	gttatccatc	cttaatcgag	agaactcatg	aattttttga	6660
	gaaaagtctt	atatactaca	atggaagacc	agacttgatg	cgtgttcaca	acaacacact	6720
	gatcaattca	acctcccaac	gagtttgttg	gcaaggacaa	gagggtggac	tggaaggtct	6780
	acggcaaaaa	ggatggagta	tcctcaatct	actggttatt	caaagagagg	ctaaaatcag	6840
·	aaacactgct	gtcaaagtct	tggcacaagg	tgataatcaa	gttatttgca	cacagtataa	6900
	aacgaagaaa	tcgagaaacg	ttgtagaatt	acagggtgct	ctcaatcaaa	tggtttctaa	6960
	taatgagaaa	attatgactg	caatcaaaat	agggacaggg	aagttaggac	ttttgataaa	7020
	tgacgatgag	actatgcaat	ctgcagatta	cttgaattat	ggaaaaatac	cgattttccg	7080
	tggagtgatt	agagggttag	agaccaagag	atggtcacga	gtgacttgtg	tcaccaatga	7140
	ccaaataccc	acttgtgcta	atataatgag	ctcagtttcc	acaaatgctc	tcaccgtagc	7200
	tcattttgct	gagaacccaa	tcaatgccat	gatacagtac	aattattttg	ggacatttgc	7260
	tagactcttg	ttgatgatgc	atgatectge	tcttcgtcaa	tcattgtatg	aagttcaaga	7320
	taagataccg	ggcttgcaca	gttctacttt	caaatacgcc	atgttgtatt	tggacccttc	7380
	cattggagga	gtgtcgggca	tgtctttgtc	caggtttttg	attagagcct	tcccagatcc	7440
	cgtaacagaa	agtctctcat	tctggagatt	catccatgta	catgctcgaa	gtgagcatct	7500
	gaaggagatg	agtgcagtat	ttggaaaccc	cgagatagcc	aagtttcgaa	taactcacat	7560
	agacaagcta	gtagaagatc	caacctctct	gaacatcgct	atgggaatga	gtccagcgaa	7620
	cttgttaaag	actgaggtta	aaaaatgctt	aatcgaatca	agacaaacca	tcaggaacca	7680
	ggtgattaag	gatgcaacca	tatatttgta	tcatgaagag	gatcggctca	gaagtttctt	7740
	atggtcaata	aatcctctgt	tccctagatt	tttaagtgaa	ttcaaatcag	gcacttttt	7800
	gggagtcgca	gacgggctca	tcagtctatt	tcaaaattct	cgtactattc	ggaactcctt	7860
	taagaaaaag	tatcataggg	aattggatga	tttgattgtg	aggagtgagg	tatcctcttt	7920
	gacacattta						7980
	tactcatgct						8040

accccatcca ttagaaatgt tgggtccaca acatcgaaaa gagactcctt gtgcaccatc	
taacacatca gggttcaatt atgtttctgt gcattgtcca gacgggatcc atgacgtctt	8100
tagttcacgg ggaccattgc ctgcttatct agggtctaaa acatctgaat ctacatctat	8160
tttgcagcct tgggaaaggg aaaggaaagh arrest the	8220
tttgcagcct tgggaaaggg aaagcaaagt cccactgatt aaaagagcta cacgtcttag	8280
agatgetate tettggtttg ttgaaceega etetaaaeta geaatgaeta taetttetaa	8340
catccactct ttaacaggcg aagaatggac caaaaggcag catgggttca aaagaacagg	8400
gtctgccctt cataggtttt cgacatctcg gatgagccat ggtgggttcg catctcagag	8460
cactgcagca ttgaccaggt tgatggcaac tacagacacc atgagggatc tgggagatca	8520
gaatttcgac tttttattcc aggcaacgtt gctctatgct cagattacca ccactgttgc	8580
aagagacgga tggatcacca gttgtacaga tcattatcat attgcctgta agtcctgttt	8640
gagacccata gaagagatca ccctggactc aagtatggac tacacgcccc cagatgtatc	8700
ccatgtgctg aagacatgga ggaatgggga aggttcgtgg ggacaagaga taaaacagat	8760
ctatecttta gaagggaatt ggaagaattt agcaeetget gagcaateet atcaagtegg	8820
cagatgtata ggttttctat atggagactt ggcgtataga aaatctactc atgccgagga	8880
cagtteteta ttteetetat etatacaagg tegtattaga ggtegaggtt tettaaaagg	8940
gttgctagac ggattaatga gagcaagttg ctgccaagta atacaccgga gaagtctggc	
tcatttgaag aggccggcca acgcagtgta cggaggtttg atttacttga ttgataaatt	9000
gagtgtatca cctccattcc tttctcttac tagatcagga cctattagag acgaattaga	9060
aacgattccc cacaagatcc caacctccta tccgacaagc aaccgtgata tgggggtgat	9120
tgtcagaaat tacttcaaat accaatgccg tctaattgaa aagggaaaat acagatcaca	9180
ttattcacaa ttatggttat tctcagatgt cttatccata gacttcattg gaccattctc	9240
tatttccacc accetettec anatestata gazzanti de la constata de la con	9300
tatttccacc accetettge aaateetata caageeattt ttatetggga aagataagaa	9360
tgagttgaga gagctggcaa atctttcttc attgctaaga tcaggagagg ggtgggaaga	9420
catacatgta aaattettea ccaaggacat attattgtgt ccagaggaaa tcagacatge	9480
ttgcaagttc gggattgcta aggataataa taaagacatg agctatcccc cttggggaag	9540
ggaatccaga gggacaatta caacaatccc tgtttattat acgaccaccc cttacccaaa	9600
gatgctagag atgcctccaa gaatccaaaa tcccctgctg tccggaatca ggttgggcca	9660
gttaccaact ggcgctcatt ataaaattcg gagtatatta catggaatgg gaatccatta	9720
cagggacttc ttgagttgtg gagacggetc cggagggatg actgctgcat tactacgaga	9780
aaatgtgcat agcagaggaa tattcaatag tctgttagaa ttatcagggt cagtcatgcg	9840
aggegeetet cetgageece ceagtgeeet agaaacttta ggaggagata aategagatg	9900
tgtaaatggt gaaacatgtt gggaatatcc atctgactta tgtgacccaa ggacttggga	9960
	<i>99</i> 60

ctatttcctc	: cgactcaaag	caggettggg	gcttcaaatt	gatttaattg	taatggatat	10020
ggaagttcgg	gattcttcta	ctagcctgaa	aattgagacg	aatgttagaa	attatgtgca	10080
ccggattttg	gatgagcaag	gagttttaat	ctacaagact	tatggaacat	atatttgtga	10140
gagcgaaaag	aatgcagtaa	caatccttgg	tcccatgttc	aagacggtcg	acttagttca	10200
		aaacgtctga				10260
		ccgattggtc				10320
		aggaatttgc				10380
		aattcattcc				10440
		cgggtgtgtc				10500
		ttagcctttt				10560
		cgatacctcc				10620
		gtataagctt				10680
		cagttatcca				10740
		agcagaagtg				10800
		tggccccaat				10860
		atccattcaa				10920
		ggtcaaattt				10980
	•	aagaccggtc				11040
		aaaaaatcat				11100
		tcttgtggtt				11160
t				•	· · · 3	11161
			-			
<210> 5						

^{· &}lt;211> 690

<212> DNA

<213> Vesicular stomatitis virus

atgagttcct taaagaagat tctcggtctg aaggggaaag gtaagaaatc taagaaatta 60 gggatcgcac cacccctta tgaagaggac actaacatgg agtatgctcc gagcgctcca 120 attgacaaat cctattttgg agttgacgag agggacactc atgatccgca tcaattaaga 180 tatgagaaat tettetttae agtgaaaatg aeggttagat etaategtee gtteagaaca 240 tactcagatg tggcagccgc tgtatcccat tgggatcaca tgtacatcgg aatggcaggg 300 aaacgtccct tctacaagat cttggctttt ttgggttctt ctaatctaaa ggccactcca 360 gcggtattgg cagatcaagg tcaaccagag tatcacgctc actgtgaagg cagggcttat 420

ttgccacaca	gaatggggaa	gacccctccc	atgctcaatg	taccagagca	cttcagaaga	480
ccattcaata	taggtcttta	caagggaacg	gttgagctca	caatgaccat	ctacgatgat	540
gagtcactgg	aagcagctcc	tatgatctgg	gatcatttca	attcttccaa	attttctgat	600
ttcagagaga	aggccttaat	gtttggcctg	attgtcgaga	aaaaggcatc	tggagcttgg	660
	ctgtcagcca					690

<210> 6

<211> 229 <212> PRT

<213> Vesicular stomatitis virus

<400> 6

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Lys

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val

Asp Glu Met Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr 65 70 80

Tyr Ser Asp Val Ala Ala Val Ser His Trp Asp His Met Tyr Ile 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly 100 105

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg 150

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His

```
Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
                              200
 Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Phe Leu Asp Ser
                          215
                                               220
 Val Arg His Phe Lys
 <210> 7
 <211> 41
<212> DNA
<213> Artificial
 <220>
 <223> PCR primer
 <400> 7
 atcgctcgag aacagatgac tacaaagacg atgacgacaa g
                                                                          41
 <210> 8
 <211> 45
 <212> DNA
 <213> Artificial
<220>
<223> PCR primer
<400> 8
ateggetage agtttttte agggateeag etetaggtgg getge
                                                                          45
<210> 9
<211> 20
<212> DNA
<213> Artificial
<220>
<223> PCR primer
<400> 9
ttgtgcttct ccactacagc
                                                                         20
<210> 10
      20
<211>
<212> DNA
<213> Artificial
<220>
<223> PCR primer
<400> 10
ctgtaagtct gttaatgaag
                                                                         20
<210> 11
<211> 21
```

-011	DNA	
<213	> Artificial	
-226		
<220		
~443	> PCR primer	
<400	> 11	
	actggc aaaacaatgc a	
-540	wooddo wwwacaatde a	21
<210	> 12	
<211	> 21	
<212	> DNA	
<213	> Artificial	
<220		
<223	> PCR primer	•
<400:		
ggtc	ettttc accagcaagc t	ت ـ
	•	21
-21A-	. 12	
<210:	P 13	
<211>	DNA	
<012×	DNA Artificial	
~~133	viciticial	
<220>	•	
<223>	PCR primer	
	- 200 Erwiict	
<400>		
atggt	tgttt ccgaagtgga c	
_		21
_		
<210>	14	
<211>	21	
<212>	DNA	
<213>	Artificial	•
-222		
<220>	Don	
<443>	PCR primer .	
<400>	14	
tttott	14	•
	cagt ttcagcacca g	21
		21
<210>	15	
<211>	24 .	
<212>	DNA	
<213>	Artificial	
	· — •••	
<220>		•
<223>	PCR primer	
_		
<400>	15	
atgtct	gtta cagtcaagag aatc	
	· ·	' 24
-010		
<210>	16	
<211>	27	
<212>	DNA	
<213>	Artificial	
<220>		
~~~~>		

<223> PCR primer <400> 16 tcatttgtca aattctgact tagcata 27 <210> 17 <211> 28 <212> DNA <213> Artificial <220> <223> PCR primer <400> 17 tacaccagtg gcaagtgctc caacccag 28 <210> 18 <211> 28 <212> DNA . <213> Artificial <220> <223> PCR primer <400> 18 gtctcgaact cctgacctca agtgatcc 28 <210> 19 <211> 20 <212> DNA <213> Artificial <220> <223> PCR primer <400> 19 acaatgagct gctggtggct 20 <210> 20 <211> 20 <212> DNA <213> Artificial <220> <223> PCR primer <400> 20 gatgggcaca gtgtgggtga 20

PCT/CA2004/000460

WO 2004/085658